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comparable with that ordinarily secured in wye leveling, which is of a much lower order of accuracy.

JOHN F. HAYFORD.

BOTANICAL NOTES.

RECENT CLASSIFICATIONS OF THE GREEN ALGAE.

THE appearance of the fourth edition of Engler's 'Syllabus der Pflanzenfamilien' (whose preface is dated May, 1904, although so far as the green algae are concerned this edition does not differ from the third, dated July, 1902); Blackman and Tansley's 'Re-

Charales). Engler sets off the Zygomyceteae, Chlorophyceae and Charales as 'branches' (Abteilungen) coordinate with Archegoniates (Embryophyta Asiphonogama), and Spermatophytes (Embryophyta Siphonogama). These he subdivides into classes, and the latter directly into families. Thus the class Bacillariales contains the single family Bacillariaceae, including all the Diatoms. West divides Bacillariaceae (as a class) into two orders, and these into no less than fifteen families. Blackman and Tansley group the

TABLE SHOWING OUTLINES OF CLASSIFICATIONS OF GREEN ALGAE.

I. (Engler).	II. (Blackman & Tansley).	III. (West) *	IV. (Oltmanns).
Branch ZYGOPHYCEAE.	Class <i>Isokontae</i> .	Class <i>Bacillariaceae</i> .	(Class) <i>Heterokontae</i> .
Class <i>Bacillariales</i> .	Series <i>Protococcales</i> .	Order <i>Centricae</i> .	(Class) <i>Acontae</i> .
Class <i>Conjugatae</i> .	Series <i>Siphonales</i> .	Order <i>Pennatae</i> .	(Order) <i>Conjugatae</i> .
Branch CHLOROPHYCEAE.	Series <i>Ulvaes</i> .	Class <i>Heterokontae</i> .	(Order) <i>Bacillariaceae</i> .
Class <i>Protococcales</i> .	Series <i>Ulotrichales</i> .	Order <i>Confervales</i> .	(Class) <i>Chlorophyceae</i> .
Class <i>Confervales</i> .	Class <i>Stephanokontae</i> .	Class <i>Chlorophyceae</i> .	(Order) <i>Volvocales</i> .
Class <i>Siphonales</i> .	Class <i>Akontae</i> .	Order <i>Protococcoideae</i> .	(Order) <i>Protococcales</i> .
Branch CHARALES.	Series <i>Desmidiales</i> .	Order <i>Conjugatae</i> .	(Order) <i>Ulotrichales</i> .
Class? <i>Characeae</i> .	Series <i>Zygnemales</i> .	Order <i>Siphoneae</i> .	(Order) <i>Siphonocladiales</i> .
	Class <i>Heterokontae</i> .	Order <i>Cladophorales</i> .	(Order) <i>Siphonales</i> .
	Series <i>Chloromonadales</i> .	Order <i>Microsporales</i> .	(Order?) <i>Charales</i> .
	Series <i>Confervales</i> .	Order <i>Schizogoniales</i> .	
	Series <i>Vaucheriales</i> .	Order <i>Ulvaes</i> .	
		Order <i>Chaetophorales</i> .	
		Order <i>Oedogoniales</i> .	

* The sequence is reversed here so as to facilitate comparison with the other systems. West begins with higher forms and proceeds from these to lower forms.

vision of the Classification of the Green Algae' (1903); West's 'Treatise on the British Freshwater Algae' (April, 1904), and Oltmanns's 'Morphologie und Biologie der Algen' (July, 1904) enables us to bring together in parallel columns the different systems of classification which they employ (see table). It will be seen that there is little agreement as to the taxonomic grade of the groups. There is even less agreement as to subdivision of groups, and least of all as to their arrangement.

In comparing these four systems it must not be forgotten that Engler's and Oltmanns's are general, including all algae, while that of Blackman and Tansley's includes the green algae only (excluding the Diatoms and Charales), and West's is confined to British freshwater algae (including the Diatoms, but not

green algae into four classes upon a single character, namely, the cilia on the zoospores and gametes, resulting in four parallel lines (classes). Their 'series' are equivalent to 'orders' in other systems. In West's system the old group Chlorophyceae is nearly the same as Engler's, but with the addition of the Conjugatae. Oltmanns's system, as far as it can be made out from the first volume ('Spezieller Teil'), is much like West's, and includes three larger groups (classes?), the second and third divided into lower groups (orders?) which in turn are divided into families. Oltmanns does not use the terms 'class' and 'order' in the volume at hand, and for this reason brackets are used in the table.

The class *Stephanokontae* of Blackman and Tansley includes the single family *Oedogoni-*

aceae. In their class Heterokontae the first 'series' purposely includes flagellate animals (*Chloramoeba*, *Vacuolaria*, *Chlorosaccus* and *Chlorobotrys*) 'since they represent the primitive organisms possessing Heterokontan characters, from which the next two series have been derived.' The series Confervales includes such organisms as *Chlorothecium*, *Mischococcus*, *Ophiocytium*, *Conferva* (of Lagerheim) and *Botrydium*. These authors include *Vaucheria* in a third series, thus widely separating this genus from other Siphonales (in the class Isokontae). This separation is not followed by either West or Oltmanns, who recognize the class Heterokontae as including the Confervales only.

On looking over the outlines of these four systems, that of Blackman and Tansley strikes one as quite the most radical. In order to be understood the position of the authors as stated in their introduction must be borne in mind, as follows: "The most fundamental of these modern conceptions is that which proposes to regard the Algae as consisting of a number of natural classes, phylogenetically independent of one another, more or less parallel in evolution, and each derived separately from the Flagellata. * * * These parallel classes are generally to be distinguished from one another by cytological characters, and more especially by differences in the organization of the zoospore, which is held to retain, throughout each class, most of the characteristics of its primitive flagellate ancestor. The most conspicuous of these differentiating characteristics of the zoospore are the nature of the assimilatory pigments, the character of the chromatophore, and the arrangement of the flagella."

If we exclude the Diatoms and Charales it is found that Engler recognizes 27 families of green algae; Blackman and Tansley, 44; West, 28, and Oltmanns, 37. Clearly, the algologists are no more agreed as to the limits of the families of the green algae than they are as to other points in the classification of these organisms.

THE CUP-FUNGI OF IOWA.

In a recent number of the bulletins from the Laboratories of Natural History of the

State University of Iowa (No. 4, Vol. V.) F. J. Seaver publishes a valuable paper on the 'Discomycetes of Eastern Iowa.' In preparation for this work the author collected 'nearly one hundred species,' of which fifty are now described, the remaining being 'retained for further study,' in the hope that they may appear in a later paper. The species described are all old, the author having wisely refrained from adding new species. The books in which each species is described are cited in connection with each description, the lists resembling lists of synonyms, which they actually are in some cases. The descriptions and notes are good, and the plates (twenty-five in number) are excellent.

SEAWEED STUDIES.

PROFESSOR DOCTOR J. J. WOLFE contributes a cytological study of the red seaweed *Nemalion* to the October number of the *Annals of Botany*, accompanying his paper with seventy-five well-drawn figures. In addition to working out very clearly the structure of the complex chromatophore he finds reasons for concluding 'that *Nemalion* presents the essentials of an antithetic alternation of generations, and that the cystocarp is, therefore, the homologue of the sporophyte in higher plants.'

SARGENT'S MANUAL OF TREES.

THIS important book has just appeared from the press, and there has not yet been time for the preparation of a complete review, which must be deferred until a later issue. It need only be said now that in a neat volume of 826 pages the author has described and figured about 642 species and varieties, which occur in North America north of Mexico. For the first time the American botanist who is especially interested in trees has a portable manual which he can use in every part of the country.

CHARLES E. BESSEY.

THE UNIVERSITY OF NEBRASKA.

NATIONAL ACADEMY OF SCIENCES.

THE annual stated session of the National Academy of Sciences was held in Washington April 18-20, 1905.

The following members were present during